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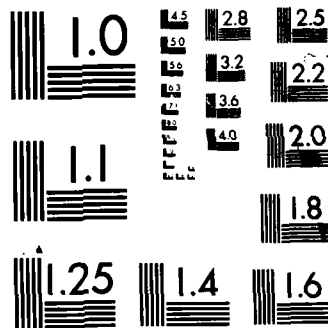
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THE CONSEQUENCES OF NUCLEAR TERRORISM

Brian Michael Jenkins

August 1979

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PREFACE

There is an extensive literature on the scientific and technological aspects of nuclear weapons development, on the relationship between weapons development and nuclear energy, on the economic trade-off between nuclear and other forms of energy, and on various strategies to discourage or to prevent the development of nuclear weapons by, or their spread to, nations that do not have them. Comparatively little research and analysis has been done on the potential political consequences if further nuclear weapons proliferation does in fact happen.

As a step toward closing that gap, the Central Intelligence Agency and the Department of Defense commissioned a number of essays and organized a colloquium under the direction of John Kerry King to examine the consequences of nuclear proliferation. The essays and the ensuing discussions were based on the assumption, provided by the colloquium's sponsors, that by the 1990s, "at least 50 countries will have the capability to develop nuclear weapons. . ." and "that more than a dozen of them of varying motivations and capabilities will have developed or otherwise acquired a nuclear weapons capability. Many others will be able to do so in a brief period." Asked to examine the consequences of nuclear terrorism, for the purpose of this paper the author further assumed that a serious incident of nuclear terrorism has occurred.

The author wishes to acknowledge the support of the Office of Regional and Political Analysis, National Foreign Assessment Center of the Central Intelligence Agency and the Office of International Security Affairs, Office of the Secretary of Defense, Department of Defense, in the preparation of this paper and participation in the colloquium. (This support was advanced solely for the purposes mentioned, and is not part of Rand's client-sponsored research. However, the Defense Nuclear Agency provided the limited support needed to make the subsequent revisions.)

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Sutton

THE CONSEQUENCES OF NUCLEAR TERRORISM

Brian Michael Jenkins

The Rand Corporation, Santa Monica, California
August 1979

In the last decade the possibility of nuclear terrorism has become an increasing concern which has preoccupied government officials, scientists, political analysts, the news media, and the public, and has inspired novelists. The fear is understandable in the current era of terrorism. Terrorist bombings, assassinations, kidnappings, and hijackings have become part of our daily news diet. Terrorists seize hostages in trains, airplanes, or government buildings. Why might not terrorists some day hold an entire city hostage with a stolen nuclear weapon or a clandestinely fabricated explosive or dispersal device?

The word "nuclear" in any context is inherently frightening. It is to many people a sinister force, recalling Hiroshima and Nagasaki, conjuring a vision of mass destruction. The idea of terrorists with nuclear weapons is especially frightening. Terrorists are often viewed as irrational and suicidal; their violence is seen as indiscriminate and random.

Many people believe that when the next nuclear bomb is used, and they believe it inevitably will be used, it will be by terrorists and not a national government. Terrorists are considered to be less morally and politically constrained than national governments. They have no territory, no cities, no populations to protect. They would be willing, it is thought, to threaten or commit mass murder. The readiness of terrorists to commit mass murder may be exaggerated. There are counterarguments that political and organizational constraints may limit the escalation of violence, even by those we call terrorists.

However, it is not the primary purpose of this paper to argue the probability of nuclear terrorism, which in the final analysis remains a matter of speculation, but instead to presume that a serious incident of nuclear terrorism has occurred, and then to examine the

consequences. Will it significantly alter the political landscape of the world? Will it change attitudes about nuclear arms or nuclear energy? Will it lead to a new international regime of cooperation and control? Will it increase the likelihood of further use of nuclear weapons by States or terrorists?

I. BASIC ASSUMPTIONS

ASSUMPTIONS ABOUT THE POLITICAL AND SOCIAL CONTEXT IN THE 1990s

In accordance with the assumptions provided as a basis for this colloquium, we are supposing that by 1990 more than a dozen countries will have acquired a nuclear weapons capability and that many others will be able to do so in a brief period if they want to. The new nuclear weapons States may include some of those regarded as dangerous, because of their political instability, unstable or reckless leaders, involvement in continuing international crises, revanchist aims, or record of military adventures. Despite this degree of nuclear proliferation, we are assuming that no nuclear war has occurred.

We further are to assume that the world's energy situation has become more critical, with fossil fuels more expensive and scarce, that an expanding world population has increased pressure on the world's food supply, that the gap between the rich and poor nations has widened, and that terrorism has probably intensified and spread.*

We may also assume that centrifugal tendencies which began with decolonization in the 1950s, and continued in the various ethnic minority and regional autonomist movements have persisted. These forces have led to the creation of new independent States in Africa, the Caribbean, and the Pacific, the majority of them the remaining chips and splinters of defunct empires. By 1990, we assume a world of 200 independent nations. Sovereignty is a powerful concept. In other areas, these centrifugal forces have led to somewhat looser central government authority through various schemes of devolution. In a few cases, they conceivably could have led to the disintegration or to the *de facto* partition of some States: Lebanon, Cyprus, Yugoslavia, etc. This centrifugal pull has affected political stability in a number of countries and complicated relationships in a number of regions, notably the Balkans, Central Asia, Southeast Asia, and possibly North America and the Caribbean.

* These were the given assumptions for all of the essays and discussions. The remaining assumptions are the author's alone.

We may also assume the existence of several regional trouble spots. Conflicts between radical and conservative Arab governments or governments dominated by different factions, internal instability caused by the stress of rapid modernization and the presence of large "foreign" minorities in the conservative oil-rich countries, and continued competition between the superpowers are likely to have kept the Middle East an area of tension despite progress in Arab-Israeli negotiations. Iran may still be suffering from constant or intermittent political violence coming from both the political left and the religious right.

Presumably, the issue of succession in Yugoslavia will have been settled by 1990, but the passing of Tito could initiate a period of instability in Yugoslavia that, combined with internal problems in Turkey and possible growing nationalist tendencies in the Soviet Union, could make the Balkans another area of international tension.

Most observers agree that the same centrifugal ethnic and national minority forces that have increased throughout the world will inevitably affect the Soviet Union as well. Although it is unlikely that the Soviet Union will fragment, by 1990 it may be experiencing internal tension on minorities issues. Tensions in Central Asia (Pakistan, Northwest India, Iran, Afghanistan) may increase as a result of continuing traditional regional conflict, for example, that between India and Pakistan, and ethnic struggles (Kurds and Baluchistanis).

Resolution of the situation in Rhodesia is likely before 1990. However, it is assumed that South Africa will experience serious guerrilla warfare beginning in the 1980s. In 1990, Indochina and the neighboring States of mainland Southeast Asia (Thailand and Burma) are still an area of local conflict with limited intervention by both China and the Soviet Union. By 1990, U.S. military support, if it still exists, may be minimal for both South Korea and Taiwan; the political future of both nations could become major issues in the 1980s.

There are several possible problems in the Caribbean, Central America, and Mexico including political violence provoked by a possible change in the political status of Puerto Rico, internal political instability (perhaps with Cuban support) in a number of Central American

countries, and growing political violence in Mexico. Finally, the Quebec separatist issue could persist through the next decade, causing some instability in Canada. In sum, there will be ample political struggles, some of which may be expressed through terrorist violence.

ASSUMPTIONS ABOUT TERRORISM

As mentioned previously, we presume terrorism will persist as a mode of political expression and of achieving limited political goals. There may be periods of diminished terrorist activity. The loci of terrorist violence may change, although Latin America, the Middle East, and Western Europe are likely to suffer a disproportionate share. The identity of the terrorist groups will change but the use of terrorist tactics will continue.

Ethnic minorities, separatists, refugee groups seeking autonomy or equality, along with others with various ideological motivations, will provide the basis for terrorist activity. We may see terrorist activity on behalf of a number of Third World issues or worldwide concerns, such as the redistribution of the world's wealth, food shortages, etc. We may also see terrorism aimed at the technology of the modern industrial States which may be viewed by "neo-Luddite" terrorists as destroying the earth and dehumanizing man. Finally, it is possible that some of the existing terrorist groups will have evolved into quasi-political criminal gangs who will continue terrorist activity--kidnappings, assassinations, extortion--to maintain a cash flow, and who may carry out specific operations on commission.

Terrorists will continue to develop links with each other, forming alliances, providing each other with various forms of support, occasionally carrying out joint operations. Some groups will receive covert support from sympathetic governments who may in turn employ terrorist groups to carry out operations against other governments.

Terrorists will become more sophisticated in their tactics and weapons. They will acquire some of the new portable weapons now being deployed in modern armies such as hand-held, precision-guided, anti-tank and anti-aircraft missiles. They will exhibit greater willingness to take on armed guards at protected facilities. The apparent

constraint on the scale of terrorist violence may erode somewhat. Several attempts to shoot down airliners with ground-to-air missiles, in two cases succeeding in bringing down airliners in Rhodesia in 1978 and 1979, and several other large-scale actions suggest a new scale of violence. In the 1980s we may see occasional terrorist incidents involving several hundred dead.

II. WILL TERRORISTS GO NUCLEAR?

Several of the participants in this colloquium, in their papers and during the subsequent discussions, mention the possibility of nuclear arms in the hands of terrorists. Putting aside the issue of the comparative likelihood of further national versus subnational acquisition of nuclear weapons, the latter possibility generally seems to give greater cause for concern than proliferation in a dozen or more States in the next ten to fifteen years.

Indeed, we seem here to have taken a rather benign view of proliferation. Possession of nuclear weapons by additional States has been viewed, at least at this meeting, as less disruptive to world order than it often has been portrayed, in some cases as even providing a stabilizing effect by inducing a more prudent national leadership once nuclear weapons have been acquired. In contrast, terrorists who gain access to a nuclear capability are considered more likely to use it.

In my personal opinion, we might be exaggerating the rationality--a slippery word--of States just as we exaggerate the irrationality of terrorists. States may launch or persist in diplomatic crusades or costly military adventures that the rest of the world may consider irrational. And groups that employ terrorist tactics may not always act irrationally. The larger groups in particular may be guided by a decisionmaking process that involves political calculations, reconciling different points of view, internal "bureaucratic" struggles, and other features inherent in national decisionmaking, not that these are in themselves any guarantee against "irrational" decisions.

That terrorists may not behave differently from States is significant in examining the possibility of terrorists wanting to acquire nuclear weapons in the first place. The basic assumption of this colloquium, that by 1990 more than a dozen nations (in addition to the current six or seven) will have acquired nuclear weapons and that many others will be able to do so in a brief period, suggests a rapid acceleration in the pace of proliferation. In fact, it is about a five-fold increase in the rate of appearance of new nuclear states.

It assumes that whatever constraints there are must have eroded badly. Nations for perceived reasons of national security--would this happen amidst wars?--diplomatic leverage, or national prestige, will have decided to acquire nuclear weapons. In some respects, such a scramble for nuclear weapons would resemble the "scramble for Africa," which occurred roughly a century ago, in which the possession of colonies for political, economic, or military reasons became an urgent necessity. Historians still debate the causes. In some cases, the stated reasons for acquisition seem to be justifications given after the fact. The scramble certainly generated some of its own momentum. So it may be with nuclear proliferation.

Plutonium stockpiles or avowed possession of nuclear weapons, even without sophisticated means of delivering them, may increasingly become the scepter of industrial progress and world power. This may be especially true in the Third World where several of the more obvious proliferation candidates are. In that sense, China's progress from a guerrilla army to a nuclear power was inspirational. Modern terrorists could try to take a shortcut.

Terrorists emulate States. If a nuclear device becomes a widely-perceived symbol of State power, terrorists may be more inclined to go nuclear, or at least to carry out actions in a nuclear domain--for example, attacking or seizing nuclear reactors.* If this emphasis on symbolism seems heavy, it should be remembered that terrorist actions are often heavily symbolic. The bombing of embassies, tourist offices, the Versailles Palace--often on anniversaries of significant past events--the seizure of the oil ministers of OPEC, the kidnapping of the former premier and probable future president of Italy, were all acts laden with symbolism. In this, terrorists, in their fashion,

* Nuclear programs have already become attractive targets for political dissidents and occasionally terrorists, not solely because of the danger they may pose to society or the environment but also because nuclear reactors have become symbols of the modern industrialized, capitalist State. Taking on nuclear programs is a means of taking on the "system."

imitate national governments.* International diplomacy is loaded with symbolic language and actions such as the dispatch of cruisers or carriers, overflights by jet fighters and other military maneuvers to "show the flag"; warm embraces for some, sober handshakes for others at State visits; ambassadors summoned home for consultations.

Thus far, terrorists have not seen fit to kill or to threaten large numbers of people. They have achieved their aims of advertisement and coercion through actions which, although shocking and often murderous, have not directly imperiled hundreds or thousands. The largest hostage situations involve one hundred to several hundred persons (held hostage when Palestinians carried out a coordinated hijacking of several airliners in 1970), although in 1978, 24 members of a guerrilla group in Nicaragua briefly held over 1500 hostages when they seized the National Palace. Incidents of mass murder are relatively rare: 73 persons died in the 1976 crash of a Cubana Airliner jet that had been sabotaged by anti-Castro emigres; 88 persons died in the 1974 crash of a TWA airliner for which Palestinians claimed credit; 121 persons died in the 1978 bombing of an apartment in Beirut; again in 1978 a deliberately set fire in a theater in Iran (allegedly by Moslem fanatics) killed over 400 persons.** Although, as mentioned

* Without stretching the comparison too far, it is interesting to note a possible relationship between the development of national airlines and the increase in airline hijacking. The possession of a national air carrier with jet airliners became one of those necessary attributes of statehood in the 1960s. The national airliner was not simply a state-sponsored commercial enterprise; often it required continued government subsidy. Like the flag, it was another symbol of the nation. Terrorists could attack governments indirectly by attacking their airliners. And in hijacking an airliner, terrorists could demand, at least temporarily, to be treated as a State. Of course, an airliner is a convenient container of hostages that can be easily moved around the world, and the primary source of the hijackers' temporary power rests upon their explicit threat to harm the passengers. Nevertheless, the symbolic content is there.

** It is possible that the Beirut explosion was not caused by a bomb planted by one of the many factions in the Palestinian movement and aimed at another. Many of the apartment buildings in Beirut where Palestinian groups are headquartered also contain large arsenals of explosives. The devastating explosion might have been accidental. Neither are the details of the fire in Iran entirely clear. No group claimed credit for the event suggesting that constraints at least against claiming credit for mass murder may still prevail.

earlier, these, along with the attempts to shoot down airliners with sophisticated hand-held missiles, may represent an escalatory trend.

The rarity of such incidents cannot be explained entirely by technical constraints, although the ease with which one can murder thousands has been exaggerated. There also seem to be self-imposed political constraints. Killing a lot of people, except perhaps for the genuine psychotic, is not an objective in itself. The capability to kill on a grand scale must be balanced against the fear of provoking widespread revulsion and alienating perceived constituents (a population which terrorists invariably overestimate), of provoking a massive government crackdown with public approval, of exposing the group itself to betrayal if terrorist group opinions on the political wisdom of mass murder are sharply divided. The groups most likely to have the resources, access to the requisite technical expertise, and the command and control structure necessary to undertake what for the terrorist groups is a large-scale operation are also those most likely to make such political calculations.

Using a nuclear capability to threaten instead of to kill outright also poses a number of problems. What can the terrorists demand? Threatening to kill thousands to spring a handful of prisoners seems out of balance. Impossible demands will not be met. Even under the threat of nuclear terrorism, a government is not likely to agree to liquidate itself. How long can the threat be maintained? If the terrorists are unwilling to dismantle the threat by surrendering the device, governments are less likely to yield. If the terrorists surrender the device, how do they enforce their demands, particularly if these are for such things as changes in policy? The "technical" problems of going nuclear are not confined to the acquisition of a nuclear capability.

On the other side of the argument, it is possible to imagine the arguments against nuclear terrorism being eroded in certain circumstances. Terrorists with more millennial visions and few perceived constituents this side of Armageddon might not worry about political calculations. A continuing terrorist campaign may have a brutalizing effect. A group may want to avenge its members who have been killed, or in some

cases tortured. The imminence of defeat may call for desperate measures. Terrorists who recognize their cause as lost may be disposed to destroy what they cannot have or alter.

Terrorists who view their opponents as dehumanized because they are of a different skin color, language, religion, for example, might be less constrained to kill on a large scale. Or terrorists might not have a particular end use in mind when they acquire a nuclear capability, but once possessing a capability, they would be likely to find a use.*

TERRORISTS COULD USE NUCLEAR WEAPONS IN SEVERAL WAYS

Although it is recognized that the immediate consequences of an event of nuclear terrorism will vary greatly according to the political circumstances of the specific act, it is not the author's intention to conjure up detailed scenarios. The possibilities are too numerous. However, it may be useful to briefly explore how different terrorist groups might use nuclear weapons.**

* Throughout this paper, we are discussing terrorists. It must be recognized, however, that there are other subnational actors who may come into the possession of nuclear weapons. One faction of a disintegrating government that already has nuclear weapons could seize the country's nuclear arsenal, or a political faction in a nuclear nation could seize and threaten to use nuclear weapons in a coup. The latter possibility has been explored by Lewis Dunn in "Military Politics, Nuclear Proliferation, and the 'Nuclear Coup d'Etat'," *Journal of Strategic Studies*, Vol. 1 (1), May 1978. Organized crime has also been mentioned as a possible nuclear actor in the future.

** There are a handful of currently active groups that, because of their financial resources, possession of the command and control necessary to coordinate a complex clandestine operation, possible access to persons with the requisite knowledge and skills to design and fabricate a nuclear device, demonstrated ability to accept risks and successfully carry out sophisticated tactical operations, and for some, possible foreign backing may be considered the most likely to carry out some kind of nuclear action, although this may not be the acquisition of a nuclear bomb. In the author's view, this group conceivably might include one or two of the Palestinian organizations, perhaps the Popular Front for the Liberation of Palestine, and Popular Front for the Liberation of Palestine-General Command; two of the continental European groups, the Red Army Faction and the Red Brigades; the Irish Republican Army; and the Japanese Red Army. It is necessary to emphasize that

Terrorists could use nuclear "weapons" in several ways. Possession of a nuclear capability--a stolen nuclear weapon, a clandestinely fabricated device, or perhaps even a well-fabricated hoax--would give any terrorist group enormous publicity. It would not simply be *another* assassination, *another* kidnapping, *another* hijacking. It would put the first group to do it in an entirely new domain. Unlike nations, however, possession alone would bring terrorists little, except perhaps for the Palestinians. In their case, possession of a nuclear capability could alter political equations in the Middle East. It also could provide the Palestinians with psychological insurance against extinction. Nuclear powers do not disappear! But the Palestinians are unique in having a political apparatus, constituents, and international recognition and support to be able to derive political benefit from mere possession. Other groups would have to do something with their capability; use it or threaten to use it. (Conceivably, the Palestinians could also use a nuclear capability to prevent an imminent Middle East settlement or to provoke another Middle East war. This does not seem a likely employment by other groups.)

Most terrorist groups are likely to see a nuclear capability as an instrument of coercion. Those groups that have been frustrated in their efforts to release imprisoned comrades might threaten nuclear destruction to crack the resolve of governments that thus far have refused to yield when faced with the conventional hostage situations. They might at the same time demand multimillion dollar ransoms to offset their investment costs in acquiring their nuclear device and to finance future operations. Finally, they could demand a number of symbolic concessions--televised concession speeches by political leaders. The temptation to "jerk the government around a bit" just to demonstrate that they, the terrorists, were in charge might be irresistible.

this is by no means a prediction, nor is the identification of these groups based upon any specific intelligence information that these groups have taken any concrete steps toward acquiring a nuclear capability. It should also be emphasized that new groups or entirely new categories of adversaries not yet identified may emerge in the 1980s.

Several terrorist groups--the IRA, for example--have shown little inclination for the kind of coercive terrorism seen in Latin America, the Middle East, or elsewhere in Europe. THE IRA has not, with a couple of exceptions, kidnapped officials, hijacked airliners, or seized hostages in other ways. Perhaps because it perceives itself more as a military organization, its operations have had a more military quality. In the hands of such a group, a nuclear capability might not be used as an instrument of coercion but rather in a more conventional manner by devastating a prestige military target without prior negotiation.

Finally, one can conceive of a more emotional use of a nuclear capability as an instrument of punishment or as a "Doomsday Machine" by a terrorist group facing imminent defeat and the loss of all that they have fought to achieve or preserve. The historical model for this would be the final desperate acts of terrorism carried out and contemplated by the Secret Army Organization (OAS) in Algeria in 1962.

THE MANY VARIABLES

There are several kinds of nuclear actions terrorists might take. What they do will affect the consequences. Terrorists could try to sabotage a nuclear facility such as a reactor, attempting to cause a core meltdown and radioactive release that might imperil the surrounding population, or they could seize control of a facility as they now seize control of government buildings, threatening to destroy it (and themselves) if demands are not met. Terrorists could also try to obtain nuclear material for the clandestine fabrication of a nuclear explosive or dispersal device, or they could try to steal a nuclear weapon which they could then threaten to detonate if demands were not met. Or terrorists could fabricate alarming nuclear hoaxes intended to cause public panic.

Scenarios for an event of nuclear terrorism may include a relatively conservative postulation of a credible nuclear threat in an urban area which, when publicized, leads to some spontaneous evacuation, perhaps a few accidental deaths, some looting, but no nuclear device ever being found; an armed assault by terrorists on a nuclear

weapons storage site leading to a brief loss of control of a weapon, possibly a detonation of the high explosive component of the weapon, with some contamination in the immediate area but no nuclear yield--and the terrorists escaping without a weapon; or the revelation of a subnational plot to clandestinely fabricate a nuclear device the details of which are not publicized. All these conceivably might occur before 1990. Or one might postulate a more serious scenario involving the actual detonation by terrorists of a small crude nuclear device that produces casualties in the low thousands, still a small catastrophe compared with war or major natural disasters, but significant more because of its perpetrators than its scale. It should be noted that even this scenario is well short of the nuclear disasters depicted in many recent novels of nuclear terrorism and some of the more lurid journalistic offerings.

There are many variables associated with scenarios of nuclear terrorism leading to innumerable combinations. Whether the nuclear device used by the terrorists is a stolen weapon whose built-in safeguards they have somehow managed to circumvent, or a nuclear device which they have clandestinely fabricated will be of major importance. In the former case, determining the original owner of the weapon would make a great difference. Was the weapon known to be stolen? Did the government losing the weapon publicly admit the theft? Was there evidence of collusion between elements of that government and the terrorists? In the case of a clandestinely fabricated device, where did the nuclear material come from: a weapons program or an energy program? Was it acquired by overt theft, corruption of officials, or through second parties? Answers to these questions would affect not only the immediate political consequences of the act but also the measures seen necessary to prevent a recurrence.

Where terrorists have used a nuclear weapon as an instrument of coercion, it is likely that the detonation would be accompanied by both prior warning and demands, although it is possible, albeit somewhat more remote, that a detonation could take place without demands as a means of establishing credibility for a threatened second detonation which would be accompanied by demands. It is also possible that

a premature or accidental detonation could take place, disrupting the terrorist plans.

If we assume a detonation after demands have been made, then we may logically assume that the demands have not been met. It would then be necessary to postulate upon whom the demands have been made: the government of the country which is targeted, another government, or several governments? Prior warning, of time but not place, could be used as a means of creating great disruption in addition to any damage done. Since the genuine threat when publicized is likely to inspire several phony nuclear threats, this disruption would be widespread.

The nature of the demands would be an important variable. We presume that the resources required to acquire a nuclear capability suggest a well-organized, well-financed group and hence that any demands made would be rational. There is the outside possibility of totally bizarre demands but these are more likely to be associated with individual lunatics and tiny groups on the psychopathic fringe, hence presumably lacking the resources to acquire a nuclear capability. Does it appear that the authors of the threat would prefer to use the device? And does the government negotiate? This is extremely important for in many previous incidents of terrorism where governments refused to negotiate and hostages were killed, we note a curious displacement of culpability. Often the government as much as the terrorists was blamed for the tragic result.

The degree of perceived government collusion in the act of nuclear terrorism will be extremely important. There will be a tendency, whatever the evidence, to see the hand of some government in the act. It is a tendency we note now in major incidents of terrorism. The display of tactical skill in the kidnapping of Aldo Moro, for example, aroused Italian suspicions of foreign involvement. Rumors suggested participation by both the CIA and KGB. We note a similar difficulty in accepting the assassination of major political leaders as the act of one person. Conspiracy theories have a powerful attraction in malevolent acts of great magnitude. Unless technological developments between now and 1990 will have made the acquisition of weapons quality

material much easier than it is now, it will be hard for many to accept that terrorists were able to acquire the material and build a bomb by themselves. We have heard many arguments that it is simply too difficult. And, as some comfort is derived from this belief--it is better to think that only governments and not just any band of political fanatics working alone can do this--one can foresee an inherent desire to see things that way if an incident occurs.

The yield and location of the device will greatly affect the consequences. The yield of the device in turn will depend on the quality of the design and the amount and nature of the nuclear material used (highly enriched uranium, reactor grade plutonium, weapons grade plutonium). The bomb dropped on Hiroshima was estimated to have a yield of 13 kilotons, that used at Nagasaki, a yield of 23 kilotons. The Indian nuclear explosion was in the 5 to 10 kiloton range. Recognizing that all such estimates are necessarily speculative, those who have discussed the matter with the author estimate the yield of a crude, clandestinely constructed nuclear device would probably be in the tenths of a kiloton range.

The effects of a blast of this size would depend on where it went off. The worst possible case would involve a detonation in the middle of a major city like New York where population densities may run as high as 100,000 persons per square mile. A one-to-six-tenths of a kiloton device detonated there would level everything within a 600-ft radius and cause severe damage beyond. From 10,000 to 20,000 people could be killed by the blast. How many more might die from immediate radiation is difficult to estimate. In an open field the immediate radiation effects would extend out to 2,000 feet from the point of detonation, but in the middle of a city like New York, the radiation would be greatly attenuated as it passed through at least several thick walls. Typical urban shielding thus might reduce the radiation effects to approximately the same range as the blast effect. In this case, the estimated number of deaths would not be significantly increased by radiation effects.* However, an additional number of

* The author is grateful to Dr. John A. Northrop for advice on this technical point.

persons also would be seriously affected (incapacitated) by radiation. In a city less densely populated, for example, the populated portions of Los Angeles County, the casualties also would be considerably less. A similar size bomb might produce 6,000 to 7,000 casualties. Approximately 95,000 persons were killed by the bomb dropped on Hiroshima (including those who died later of radiation); estimates of the number of persons who died as a result of the Nagasaki detonation range from 39,000 to 74,000.

There is no precedent outside of war for a single incident with casualties in the range mentioned for a hypothetical detonation in a city as densely populated as New York. The only historical equivalents are natural disasters. Some massive earthquakes and floods or tidal waves in heavily populated areas have killed tens of thousands. There have been only about five earthquakes in the twentieth century with casualties of this scale. The median earthquake of the major twentieth century earthquakes killed about 6,000 persons. In these cases, the casualties are scattered over a wide radius. A few major dam breaks have killed in the low thousands. The worst shipwrecks have resulted in as many as 1,000 to 1,500 deaths; the worst fires, 500 to 1,500 dead, and the worst peacetime explosions (outside of coal mines), our closest physical analog, have killed from 300 to 1,500 persons. For example, 1,500 persons were killed on December 6, 1917, in Halifax, Canada, when a ship loaded with ammunition collided with another vessel. An explosion in 1956 involving seven trucks loaded with ammunition killed 1,100 persons in Colombia. The explosion of a ship loaded with fertilizer killed 516 persons in Texas City, Texas, in 1947.

It is not simply the number of casualties that will affect the world's perceptions of the incident but also where they occur. An incident that occurs in Asia, Africa, or Latin America is likely to be less shocking (at least to the North Atlantic population) than one that occurs in Western Europe or North America. We are more accustomed to immense natural disasters with great loss of life in the so-called Third World. We also have a greater expectance of political violence in the Third World. A nuclear explosion in Pakistan or elsewhere in

the Middle East would conform to the perception of these nations as being wild countries, would set tongues clicking, but would not have the impact of a similar detonation in Paris or London. An explosion in the Soviet Union or China is likely to have less impact because both the blast and the consequences are likely to be shrouded in secrecy. On the other hand, a nuclear explosion in a Western nation would provoke tremendous media coverage and investigation.

Timing is important, too, although perhaps not as important as location. An explosion that occurs in the midst of a civil war, for example, during some future equivalent of the Spanish Civil War, or intense fighting in Beirut, will have somewhat less impact through the media than an explosion in a less turbulent environment. The presence or absence of large-scale warfare in other parts of the globe that may distract public attention from focusing for a length of time on a single nuclear incident would also have an effect.

III. THE CONSEQUENCES

We presume now in our discussion that an act of nuclear terrorism has occurred. The immediate political consequences of that act would depend on the political circumstances in which the incident occurred, plus the other variables mentioned. These are extremely difficult to predict. As mentioned before, it would make a great difference whether Palestinian terrorists threatened to blow up Tel Aviv or West German terrorists grabbed an American nuclear weapon in Europe.

There are, however, broader consequences that would derive from the simple fact that a group outside any government (although perhaps with government help)--a *terrorist* group-- had acquired and threatened, credibly, to use or actually detonated a nuclear device. The immediate assumption would be that it could happen again, indeed would happen again unless preventive measures were taken, that the consequences would be equally as bad, or if the detonation was not particularly destructive, that the consequences would be worse the next time, therefore that the terrorists, any terrorists, must be stopped.

INCREASED SECURITY AT ALL NUCLEAR FACILITIES

The first obvious consequence would be the increase of security at nuclear facilities everywhere. It might make some difference whether the device used by terrorists was a stolen nuclear weapon or an explosive device clandestinely fabricated by terrorists. In the former case, some might argue against unreasonable increases in security at civilian nuclear facilities as unwarranted. But this argument would be considerably weakened by the terrorist event. The detonation of a stolen nuclear weapon would undermine confidence in physical security measures and in the protective technology (assuming that everyone's nuclear weapons had some permissive action link that destroys the weapon if it is tampered with). It might bring about increased concern on the part of governments of countries that are hosts to others' nuclear weapons. For example, the detonation of an American nuclear weapon stolen in Europe, or even the successful theft of nuclear

weapon in the United States could bring about increased pressure to remove all American nuclear weapons from Europe. To counter such arguments, security would have to be visibly improved.

If it turned out that the device had been fabricated with material removed from civilian nuclear programs, increased security measures would be imposed across the board. Initial security measures at both civilian and military nuclear facilities could take the form of troop deployments like those around vital defense industries in wartime. In most Western nations, the troops would be seen as a temporary measure, permitted by hastily implemented legislation until a permanent guard force would replace them. Guarding nuclear facilities would probably be taken out of private hands. The cost of nuclear energy would not be significantly altered by the added security costs. Depending again on exactly how the terrorists acquired the material used in the bomb, increased security measures would also extend to the employees, particularly those having access to material and those with the expertise to design and build nuclear weapons. This would entail the wider application of background checks, more rigorous investigations, and closer monitoring of employees in sensitive positions or having special skills.

Finally, governments would be compelled to consider procedures they might follow after a theft of nuclear material or of a nuclear weapon has occurred, or after a credible nuclear threat has been made. Presently, far less attention is paid to this area than to preventive measures. More attention would have to be devoted to contingency planning for search and recovery and the possibly predeployment of nuclear search equipment and teams of operators. Governments would have to give advance consideration to the kinds of restrictive legal measures that might have to be imposed temporarily to deal with a nuclear threat.

The real possibility of nuclear terrorism would also raise basic policy questions. Governments would be compelled to reexamine current no-negotiations or no-concessions policies. These policies were originally formulated in cases where the terrorists' ability to kill hostages was clearly limited. In case of credible nuclear threats,

governments might have to abandon the perception of the event as a zero-sum game with no middle outcomes. Negotiations and limited concessions might be considered necessary if only as a means of delaying any action while gaining information about the terrorists.

Finally, more attention also would have to be given to the requirements of decontamination and normalization. Such problems, of course, arise in nuclear war, too, but in a wartime environment they may be of secondary importance to national survival, whereas in the case of a small peacetime nuclear explosion set off by terrorists, prompt treatment of any civilian casualties and rapid decontamination and restoration of property might be a test of government competence and a prerequisite of its political survival.

CRACKDOWN ON ALL DISSIDENTS

Governments everywhere would be likely to become a bit more repressive in an age of nuclear terrorism. Known terrorist groups and political dissidents would be the target of crackdowns whether or not they were in any way connected to the nuclear terrorists, espoused similar causes, or were believed to have the same capabilities to acquire nuclear material, design and fabricate a nuclear weapon. In some cases, the crackdown would be motivated by genuine fear, however remote, of further acts of nuclear terrorism. In other cases, the act of nuclear terrorism might be an excuse for declaring war on anti-government dissidents.

Special legislation similar to that in the Atomic Energy Act might be introduced prescribing stronger penalties for unauthorized possession of nuclear material, nuclear extortion, etc. Since society cannot afford to await the commission of a nuclear crime, efforts will be made to move back the moment of crime further into the conspiracy stage. Sales of scientific instruments (dosimeters, etc.) associated with the fabrication of nuclear devices might be monitored more closely. Acquisition of such specialized equipment could itself become grounds for police surveillance even though no crime had been committed. Intelligence activities would increase.

Apprehension about further acts of nuclear terrorism might also lead to durable changes in police procedures. Faced with a threat of nuclear terrorism, police might be permitted to detain persons for an indefinite period without having to bring charges against them, might conduct area-wide searches without warrants, and use otherwise prohibited interrogation techniques, for example, lie detector tests without permission of the subject. Specific legislation might be introduced authorizing the imposition of martial law and the use of military forces to assist in searches in the event of nuclear threats.

Inevitably, the contemplation of such measures, as reactions to nuclear terrorism threats, would provoke civil rights arguments. Opponents of nuclear programs have already raised the issue. They fear that in a world full of nuclear reactor and nuclear weapons, States will tighten their reign over citizens in order to prevent dangerous elements from getting access to nuclear material. Thus, to them, a world dependent on nuclear energy, even more a world in which the proliferation of nuclear weapons has become a fact, and especially a world in which nuclear terrorism has become a reality, is inevitably an increasingly authoritarian world.* Nonetheless, a badly frightened public might permit, even demand, such measures to preserve their sense of security.

LIKELIHOOD OF FURTHER NUCLEAR TERRORISM

A threshold would have been crossed. Nuclear terrorism--an unwarranted fear in the eyes of some, a theoretical possibility, an inevitability to others--would have become a fact. It could be done. It had been done. Certainly it could be done again. Whether the terrorist group responsible for the first incident would do so again would depend on the assumptions in the scenario. Does the group have more than one nuclear device? Does it have more nuclear material?

Major terrorist incidents often inspire imitation. An incident of nuclear terrorism would almost certainly set off the lunatics who would threaten to blow up cities unless policies were changed, enormous

*This argument is cogently presented by Robert Jungk, *Der Atomstaat*, Munich: Kindler Verlag, 1977.

ransoms paid, or totally bizarre demands met. Although most such threats are patently the products of mentally disturbed individuals, in the aftermath of a real incident such threats are likely to be taken more seriously and, if publicized, could cause panic.

Whether other terrorist groups would want to emulate the first authentic nuclear action would depend on whether it was perceived as successful. Did the incident provoke widespread revulsion? If so, it is less likely to be emulated. Did the terrorists achieve their aims? Did governments yield to their demands, if any? Did the group survive the inevitable crackdown? If the answer to these questions is yes, then further attempts may be made. Of course, few terrorist groups would have the necessary resources to go nuclear. Groups that do not might consider a bluff, exploiting the fact that after a nuclear explosion, governments may be somewhat more reluctant to call a bluff. Or, they might consider other weapons of mass murder, chemical or biological. The immediate post nuclear terrorist age would be an era of alarming hoaxes.

Finally, assuming a nuclear detonation had occurred, survivors, members of the victims' ethnic group or relatives of survivors, sympathizers of the victims' political stance, might seek revenge against the terrorists and against the State believed to have backed them in their enterprise. An act of nuclear terrorism may be followed by increased terrorist activity directed against the perpetrator or their perceived allies.

PRESSURE TO INCREASE INTERNATIONAL COOPERATION IN THE AREA OF SECURITY

A credible threat of nuclear terrorism demonstrated by the detonation of a weapon would undoubtedly increase demands for greater international cooperation to prevent another occurrence. The security of nuclear programs would no longer be a concern of each country but rather it would be seen as an international imperative. The universal adoption of stringent minimum security measures would be urged, perhaps through new collective treaties and possibly by giving the International Atomic Energy Agency increased responsibilities. This would accelerate a trend visible now in the IAEA unofficial efforts to

improve physical protection at nuclear facilities, as reflected in the 1975 Agency-sponsored booklet entitled "Recommendations for the Physical Protection of Nuclear Material." However, it would depart somewhat in that greater IAEA responsibilities could lead to a confrontation with member States which rigidly adhered to the principle of national sovereignty in matters of security.

Many might regard security standards alone as insufficient and would argue for the internationalization of nuclear facilities, at least for those where weapons-grade material may be readily available. There might be demands that national nuclear facilities be guarded by an international security force, or, at the very least, that security arrangements be subject to international inspection. This would be a dramatic departure from the principle of national sovereignty in matters of security, and would be likely to run into some resistance. On the other hand, some nations who, in the wake of the first incident of nuclear terrorism, might see themselves being blackmailed in possible future incidents, perhaps even fearful of political elements within their own country, could regard internationalization of nuclear facilities or international protection of nuclear facilities as their own best protection, and politically acceptable so long as it is indeed international.

Concerned supplier nations might go further, threatening to cut off nuclear services (fuel, replacement parts, technical assistance, reprocessing) to delinquent nations, or impose even more serious sanctions: trade embargoes, suspension of air traffic, denial of loans. Some could go so far as to threaten military measures, such as blockades against obvious offenders.

Beyond increasing security, increased international cooperation to prevent or respond to a terrorist nuclear threat would be sought. This would range from arrangements to share certain categories of intelligence, to agreements regarding hot pursuit in case of stolen nuclear material, to the creation of mechanisms for international action in case of a threat, international consultation in case of nuclear threats to one or more nations, emergency search teams, and multilateral military response forces. Fear of future acts of nuclear

terrorism also might lead to the sharing of specialized security technology such as the permissive action link systems that currently prevent nuclear weapons from being detonated by unauthorized persons.

If these efforts followed the two historical patterns of the Non-Proliferation Treaty and international cooperation to combat terrorism, then we could expect those nations who generally feel the most threatened by terrorism and those who have the strongest nuclear disarmament and anti-nuclear energy interest groups to take the lead. Terrorism affects the world unequally; the Western democracies feel most threatened. Nations less affected have looked upon terrorist violence as a legitimate mode of warfare in some cases, and efforts to increase international cooperation against terrorism as a scheme to preserve a colonial status quo in most cases. Consequently, these efforts have been resisted, with serious cooperation confined to a handful of like-minded governments.

Nations that want to eventually develop nuclear weapons, to have secret weapons programs, or on-the-shelf nuclear capabilities would resist any new international measures that might reveal or frustrate such plans. Nations that are dependent on others for nuclear technology or fuel would also be likely to fear any move toward tighter international control as a step toward a permanent nuclear hegemony by the supplier nations for economic or political reasons.

If these two sets of nations are subjected to pressure or sanctions, one can foresee two kinds of consequences. The first would be a move toward nuclear programs that allow greater national self-sufficiency. Second, one can see the development of a demand for a nuclear blackmarket, if by 1990 one does not already exist, to provide needed supplies to embargoed nations. The historical analog here may be the secret trade that has gone on with Rhodesia despite its being subjected to an international economic embargo.

While recognizing that pressures for greater international control would increase in the aftermath of an incident of nuclear terrorism, it is difficult to foresee greater cooperation than that which exists now in the terrorist area or on the issue of nuclear proliferation. Sovereignty probably will prevail. Nations will maintain

control of their own security programs. It is hard to see how minimum security standards can be insured. Many will also argue against sanctions as a means of coercing international cooperation, pointing out that such leverage is limited and more can ultimately be accomplished through persuasion. More countries will possess enrichment and re-processing capabilities, further reducing the influence of the handful of countries that now have these capabilities.

Alternately, if the 1970s pattern of terrorism continues into the 1980s, with a slight escalatory trend in the death and destruction caused by the individual acts, one can see a corresponding inclination toward "gun-boating" on the part of the most frequently targeted nations. This began with the Israeli retaliatory raids and the Israeli rescue operation at Entebbe in 1976, the West German rescue of hostages at Mogadishu in 1977, and the attempted Egyptian rescue operations at Larnaca in 1978. More heinous terrorist crimes might provoke greater use of military force, and with less regard for sovereignty, to prevent, resolve, or retaliate for terrorist incidents. By 1990, it is possible that limited military forays, at first unilateral, later perhaps multinational, against terrorists or States that harbor terrorists, might become commonplace. In such circumstances, an incident of nuclear terrorism would increase this tendency, giving greater likelihood to multinational sanctions and the use of military force if necessary to force compliance with security standards. At any rate, it seems more likely that there would be some success attained in the area of cooperation in case of a nuclear threat than in the area of international security to prevent action.

In sum, while nuclear terrorism may be universally perceived as a common threat, this will not readily translate into a consensus on the necessity and nature of greater international cooperation and control except as the cooperation may pertain directly to an imminent threat.

INTENSIFIED DISARMAMENT AND NUCLEAR ENERGY DEBATES

The possibility of nuclear terrorism has in recent years become both the dread and the ally of the proponents of nuclear disarmament and the foes of nuclear energy. They fear the possibility. That

others may share their fear lends weight to their arguments against nuclear programs. An act of nuclear terrorism would infuse strength and an element of desperation into the anti-nuclear movement. To the movement, a society free of nuclear weapons and reactors would become an imperative if society is to be preserved.

Anti-nuclear opponents who believe that the expansion of nuclear energy programs--viewed by many of them as a potential arsenal for terrorists--and the proliferation of nuclear weapons must be halted by mobilizing world public opinion, and massive protests, could turn to direct violent action. There is already apparent in the anti-nuclear energy movement a slight escalatory trend visible in the recent attacks on nuclear facilities in Europe and the potential of international political protest on the scale and intensity of the anti-Vietnam War movement of the late 1960s and early 1970s. Although few of those protesting the Vietnam War could by any stretch of the term be called terrorists, the demonstrations, confrontations with police, injuries, arrests, and further confrontations were a radicalizing process that ultimately produced on the extreme fringes tiny groups like the Baader-Meinhof Gang, the Japanese Red Army, and the Weather Underground who turned to terrorist tactics to continue their struggle.

We might expect incidents of sabotage, armed assaults, seizures of facilities, deliberate contaminations. The possibility of casualties resulting from these actions might be more easily justified by the perpetrators in an environment where nuclear terrorism is a reality. They might believe that the lives of a few employees or bystanders would in no way approach the number of casualties of a nuclear device actually detonated by terrorists. At the extreme could be the threat of further nuclear terrorism by the anti-nuclear groups to achieve nuclear disarmament or halt nuclear energy programs. (This assumes that the perpetrators of the first actual incident of nuclear terrorism were not motivated by the cause of disarmament or opposition to nuclear energy programs.)

Increased security at nuclear facilities and over individuals in nuclear programs, which is likely to follow an incident of nuclear

terrorism, would be seen as evidence of the fact that nuclear programs and a free society are incompatible. Increased security measures might also provoke certain employees, some of whom might in turn respond with small acts of resistance: bomb threats, low-level sabotage, etc.

The debate would be most intense in the victim nation (where the detonation occurred). Some people would respond with strong support for total nuclear disarmament. Others might demand revenge or that measures be taken (even the development of nuclear weapons) to prevent the repetition of such an act.

For some, the anxiety produced by the fact of nuclear terrorism might manifest itself in religious or quasi-religious expressions. It is interesting to observe how the anti-nuclear movement has for many taken on a religious tone. Recently, protesters splashed what they said was their own blood on the Pentagon Building in Washington to dramatize their demand for the abolition of nuclear weapons. One of the demonstrators explained that the demonstration reflected the biblical Massacre of the Holy Innocents. "After the birth of Christ, Herod issued a blanket order to massacre all boys two years and younger. The connection is that kids today don't have any future with the bomb and the weapons race and the membership of the nuclear club increasing."

Nuclear terrorism might inspire some to crusades, others to seek escape. Still others may develop elaborate conspiracy plots to explain the event. Several of today's religious cults perceive the biblical Armageddon as a nuclear holocaust. James Jones, the dead leader of the People's Temple who persuaded and coerced 900 of his followers to participate in a ghastly ritual of mass murder and suicide, was in his earlier years reportedly obsessed with the fear of nuclear war, even moving his family to a city in Brazil which had been described in a magazine article as one of the nine safest places to hide in case of a nuclear war.

We may also anticipate a more diffuse reaction against all advanced science and all high technology, adding to the already apparent anti-technology "neo-Luddite" sentiments. Other areas of scientific

research or development, especially those that have been controversial in terms of a potential threat to society, could be subjected to assault.

Against the proponents of disarmament and the foes of nuclear energy, would be those who would argue that it would be crazy to give up nuclear weapons, if a government already has them, or to forego their development if not, in so dangerous a world in which even terrorists have nuclear weapons. To deter nuclear attack by terrorists, a government must be able to respond in kind, if not against the terrorist attackers, then against their secret "backers."

The anti-nuclear pressure might persuade a few governments to proceed more cautiously, perhaps to defer a decision to go nuclear, but would not be likely to lead to universal disarmament. It could, however, impede the expansion of fission reactors for energy purposes, especially if there were nonnuclear or nonfission technologies available or coming into production.

THREATS OF UNILATERAL PREEMPTIVE ACTION

In the absence of effective international action, the most threatened nations might warn that they would take unilateral preemptive military action if necessary to prevent another occurrence of nuclear terrorism. It would be asserted that such actions were legitimate under the humanitarian intervention clause in international law, although certainly this assertion would not be universally accepted. Actual cases of such intervention are likely to be rare. There would be considerable factual uncertainty about the precise nature and location of the suspected nuclear activities. Cooperation among intelligence services between friendly countries would preclude the need for armed intervention. In the case of unfriendly countries, the clandestine nuclear activities might be known to the host government and protected by it, making any military intervention significantly more risky. Nonetheless, there are precedents in military history in the U.S. raid on Son Tay and the Israeli operations against Egyptian radar stations and Palestinian terrorists in Beirut, as well as the recent armed rescues of hostages. It is noteworthy

that most of these incidents took place during war or protracted conflict. Threatened nations might also warn others that they would hold responsible for the consequences of nuclear terrorism any nation that had assisted the terrorists or had failed to take adequate measures to prevent terrorists from carrying out a plan to fabricate, use, or transport a nuclear device. There is some precedent for this in international law.

FURTHER NUCLEAR PROLIFERATION

Will the fact of nuclear terrorism accelerate nuclear proliferation or slow it down? The answer to this question would depend in part on the circumstances of the first act of nuclear terrorism and on the subsequent response taken by the world, but whatever circumstances, one can see some nations deciding to go nuclear, others deciding against it.

As mentioned previously, there might be a built-in tendency to see government collusion in an act of nuclear terrorism whatever the evidence, as is often the case now with conventional terrorism, and there might be considerable uncertainty about the facts anyway. At the very least, it will be believed that certainly some nation must have known about the effort beforehand and said nothing. The perception of the terrorist act as an act of surrogate warfare facilitated, perhaps directed, by some foreign government, might persuade the victimized nation or other threatened nations to brandish a nuclear capability (or develop a nuclear capability if they do not already have one) in order to be able to threaten retaliation in kind, not against the terrorists who provide no suitable target for nuclear retaliation but against the State that is believed to have assisted them. For example, an act of nuclear terrorism carried out by Palestinians today would inevitably arouse Israeli suspicions of complicity by one of the more radical Arab governments and possibly bring Israeli warnings that Baghdad or Damascus would not survive Tel Aviv if terrorist nuclear threats were directed at Israel. Even if evidence were lacking of involvement by any Arab government, the Israelis might still issue such warnings in the belief that some of

the Arab governments would be able to obtain information about the nuclear effort and halt it.

Apart from suspicions of foreign government involvement, the fact of nuclear terrorism would imply a world at once less stable and more dangerous, an environment which generally leads to arms buildups and, in this case, could move a decision toward acquiring a nuclear capability just in case. There would also be the "prestige factor" that might take the form of questions, such as, "How can we, a nation of importance in the world, *not* have nuclear weapons in a world in which *even* terrorists have them?"

Nuclear terrorism might also generate arguments against acquiring nuclear arms. The foes of nuclear weapons would have new arguments and new strength derived from the revulsion that a serious incident of nuclear terrorism is likely to provoke. There may be fears that a nuclear weapons program will only increase the risks of nuclear terrorism domestically. It would be argued that the best way to keep nuclear weapons out of the hands of terrorists is not to have them. The political unattractiveness of being the first country after terrorists, whom the world would be denouncing, to announce the acquisition of nuclear weapons might cause some to defer. A nation that announced a nuclear weapons capability while the world is still in shock from a nuclear threat or attack by terrorists could bring the world's wrath down on itself.

Increased intelligence activities aimed at uncovering clandestine nuclear weapons programs could also make it more difficult for a nation to covertly carry out a decision to go nuclear. Possible restrictions on the further export of nuclear technology or nuclear material, unless the recipient agreed to minimum security measures and international inspection, would put further obstacles in the path toward nuclear weapons.

RENEWED ATTENTION TO OLD STRATEGIC PROBLEMS

A nuclear detonation by terrorists would refocus attention on several strategic issues that have occasionally in the past been examined. One is the problem of signature. If there is an anonymous

detonation, which seems out of character for terrorists, it will be necessary to rapidly determine whether it is the result of an enemy attack or a terrorist weapon. (This author has no knowledge of the technical problems or the state of the art in this area.) The possibility of an attempt by terrorists to provoke a major war cannot be overlooked, nor can the possibility of a paramilitary nuclear attack by an enemy state, perhaps using deliberate small yield, crudely-designed weapons to mislead the targeted nation. The topics of paramilitary nuclear attack or surrogate nuclear war would receive close attention. So would the problem of clandestine delivery of nuclear weapons, both the military possibilities and defense against this mode of attack. Finally, the problems of evacuation of cities in the case of possible future nuclear threats by terrorists would probably increase attention to civil defense measures.

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